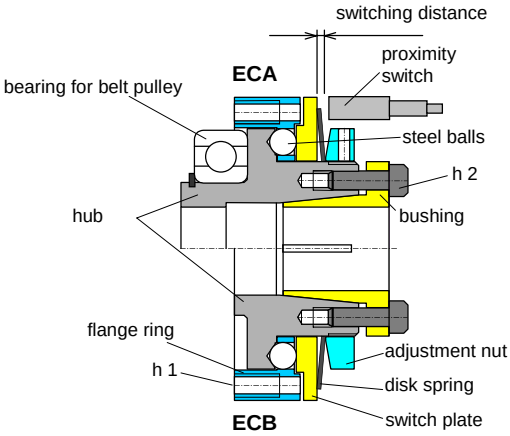
ENEMAC Operating instructions Safety couplings types ECA ECB (ECC)

mode of function

When the machine is operating normally the steel balls are pressed by the disk spring into the cupped recesses located in the flange ring, thereby transmitting the torque from the hub to the flange ring and vice-versa.



overload

In the event of overloading the hub turns round in relation to the flange ring and presses the balls out of the recesses back against the disk spring
- the coupling clicks over - (once per revolution in case of fixed point switching) and actuates the proximity switch, which has to shut off the drive immediately.
The coupling is only designed to click over for a short period !

engage

After elimination of the disturbance, the coupling has to be rotated
- with low rotational speed or by hand -
and reengages automatically (audible) in the fixed point position.
The coupling now is operational, the adjusted disengagement torque is effective.

technical data

ECA	1	3	6	16	25	40	63	75	100	130	250	400
ECB + ECC		3	6	16	25	40	63		100		250	400
torque range (adjustable)												
TA max (Nm)	0,9	3	6	16	25	45	75	75	130	130	250	400
TA min (Nm)	0,5	1,2	2,5	6	10	20	30	30	50	50	100	160
max. rotational speed (min^{-1})	3000	3000	3000	3000	3000	3000	2500	2500	2500	2500	2000	2000
thread of screws h 2 6x	M3	M4	M4	M4	M5	M5	M6	M6	M6	M6	M8	M8
torque of hub screws h 2 (Nm)	1	1,5	1,5	2,5	3	4	6	6	8	8	35	35
thread of flange ring h 1 6x	M3	M4	M4	M4	M6	M6	M6	M6	M6	M6	M8	M8
max. screw position i (mm)	6	8	8	10	12	12	12	12	12	12	16	16
metal bellows data type ECC	(type ECC is no longer available)											
max. shaft misalignment												
lateral (mm)		0,27	0,27	0,2	0,2	0,2	0,2		0,2		0,2	0,2
axial ± (mm)		0,8	0,8	0,8	0,9	0,9	1,3		1,2		1,2	1,0
torsion resistance (10^3 Nm/Rad)		5	5	21	33	33	54		66		108	164
lateral spring rate (N/mm)		29	29	189	262	262	218		401		503	692

The torque data are valid for the *tightening screws h 2* of the bushing only.
The *screws h 1* for the pulley must be tightened with the usual torque !
Please take notice of the *max. screw position i* (into the flange ring)

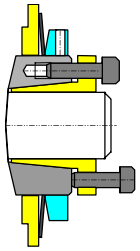
installation instructions

general remarks

1. The kind of fit between bushing and shaft must be a sliding fit (e. g. H7/j6 or G7/k6).
   The frictional connection will not be impaired by existing keyways.

2. During delivery the screws of the bushing are slightly tightened. To enable the hub slipping on the shaft, the bushing and it's screws have to been loosened.

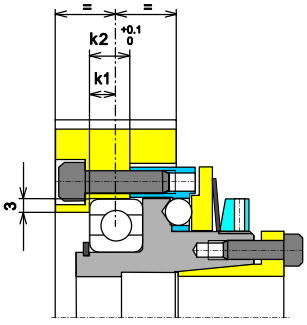
3. The screws must be tightened cross-wise to avoid axial run-out of the coupling. Especially with type ECB a severe wobble will cause tilting of the pulley and seizing up on the shaft end. In case of collision the pulley cannot rotate and the coupling cannot disengage.
   Tightening torque of screws see *Technical data.*



4. dismounting
   After unscrewing the 6 tightening screws the bushing is released from the hub by means of 3 draw-off screws (see illustration to the right). If axial space is restrictive it is advisable to screw in the draw-off screws before mounting the coupling and to counter check them against the hub.

5. emergency switching
   In case of overload the drive must be turned off immediately by means of an emergency switching. A proximity switch can be activated by the axial motion of the switch plate of the coupling and initiate the machine stop.
   All couplings are designed for 250 overload cycles.

6. mounting in vertical axes of CNC machine tools
   It must be taken in consideration that after disengagement the EC-coupling has a residuel torque so low that in most of cases it is insufficient to prevent the descenting of the machine axle.



for safety couplings type ECA

7. The axial center lines of the belt pulley and the ball bearing of type ECA should be in alignment, to prop the traction of the belt directly by the bearing (see illustration to the right).

8. The kind of fit between pulley and bearing must be a sliding fit (H7/h5).
   Dimension k 2 must be machined *within 0 trough +0.1 mm.* The stop collar at left of the outer race of the bearing must at least have 3 mm to guarantee the plane rest of both parts (see illustration to the right).

for safety couplings type ECB

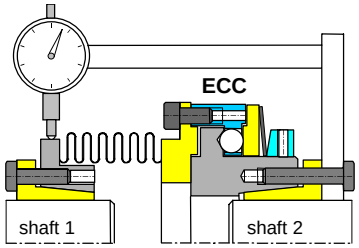
9. A pulley to be attached to type ECB must have *a complete plane surface on the side of the coupling.*
   As well the ECB as the pulley are separately centered to the shaft thus an additional centering between both is in no way tolerable.

ENEMAC Operating instructions Safety couplings types ECA ECB (ECC)

for safety couplings type ECC (type ECC is no longer available)

10. **ATTENTION!** The metal bellows of the ECC's are made of thin stainless steel thus beeing susceptible to shocks. Damage to bellows can result in an unserviceable coupling !

11. The ECC can compensate for shaft misalignments within certain limits *(= max. lateral shaft misalignment* see *Technical data).*



It must be acted upon the following instructions to obtain the actual *lateral shaft misalignment:*

The set-up of the dial gauge is shown by the picture, i. e. fastening of the gauge to one side *(shaft 2)* of the already mounted coupling and zero adjustment of the caliper.
A 360° turn of the complete measuring system and observation of the maximum reading.
The *lateral shaft misalignment* is half of this reading.

In case of a set-up without a mounted ECC the dial gauge has to fastened to *shaft 2* and the caliper adjusted to *shaft 1.* Turning *shaft 2* by 360° the maximum reading will include the amount of defect of form (=out of round), but this deviation can be neglected in nearly all cases.

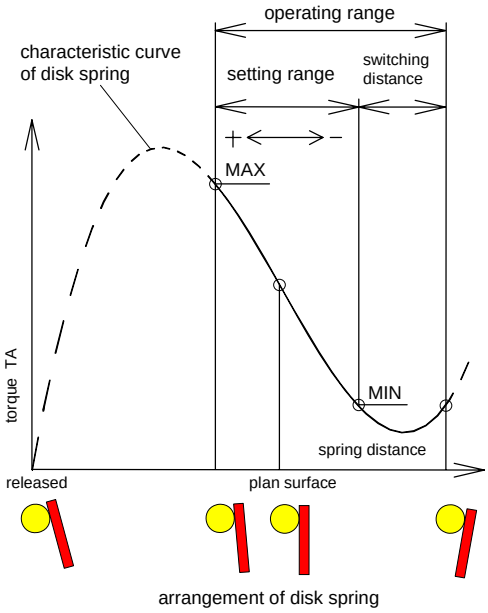
The complete 360° turn of the measuring system is essential !

12. Mounting of the ECC-coupling
The first step is to position the coupling loose on both shaft ends and then to tighten it to *shaft 2.* Possible axial tension of the bellows must be released by turning one shaft end while stopping the other one. The bushing of *shaft 1* may not be tightened before completing this tension release. During mounting the bellows shall not be deformed too much. Permitted are 0.6 mm lateral and ± 1 mm axial.
Under operation conditions however the values of *Technical data* are valid.

adjustment of disengagement torque TA

The disengement torque T_A is continuously adjustable (without change the disk spring) !
Special torque ranges on request.
The couplings are pre-set by the manufacturer on assembly at about 70% of the maximum torque.

The torque can be subsequently adjusted by turning the adjustment nut with a sickle spanner. Loosen the Allen set screws beforehand !



arrangement of disk spring

IMPORTANT ! The characteristic curve of the disk spring is diminishing within the setting range !

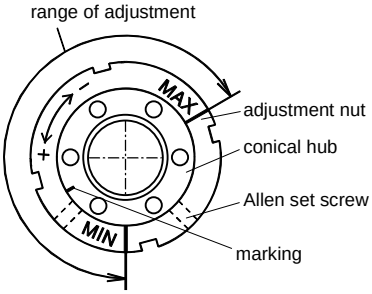
Opposite to the common practice this results in the effect, that turning the adjustment nut

clockwise ⇒ T_A decreases
counter-clockwise ⇒ T_A increases

(see illustration to the right and foot)

The really effective T_A can only be measured precise, if

- coupling and belt-pulley or intermediate flange are assembled or
- the measuring device simulates this assembly and
- points 7 trough 9 of the *Installation instructions* are taken into consideration



The marking on the hub (see illustration to the left) must be between MIN and MAX in the adjustment range (=greater part of the circumference of the adjustment nut).
By no means adjust torque below MIN, because in that case the disk spring will be blocked during disengagement, and the coupling will not operate.
After adjustment the nut has to be fixed against turning by means of the Allen set srews (fixed with LOCTITE 222 or similar).

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ENEMAC Operating instructions Torque Limiters types ECE ECG ECH ECI ECR

mode of function

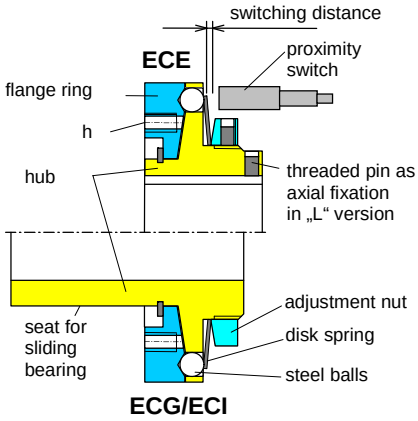
When the machine is operating normally the steel balls are pressed by the disk spring into the cupped recesses located in the flange ring, thereby transmitting the torque from the hub to the flange ring and vice-versa.

overload

In the event of overloading the hub turns round in relation to the flange ring and presses the balls out of the recesses back against the disk spring
- the clutch clicks over - (once per revolution in case of fixed point switching)
and actuates the proximity switch, which has to shut off the drive immediately.
The clutch is only designed to click over for a short period !

engage

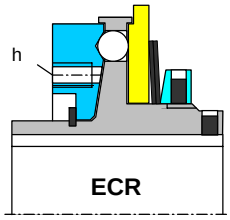
After elimination of the disturbance, the clutch has to be rotated
- with low rotational speed or by hand -
and reengages automatically (audible) in the fixed point position.
The clutch now is operational, the adjusted disengagement torque is effective.



technical data

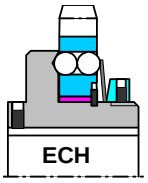
ECE ECG		5	10	16	25	40	63	100	200	315		630		900
ECI		5	10	16	25	40	63	100	200		315		630	900
torque range (adjustable)														
TA max	(Nm)	5	10	16	25	40	63	100	200	315	315	630	630	900
TA min	(Nm)	2	4	7	10	16	25	40	80	140	140	280	280	400
max. rotational speed	(min^{-1})	3000	3000	3000	3000	3000	3000	2500	2500	1800	1800	1800	1800	1800
thread of flange ring h	6x	M5	M5	M6	M6	M6	M6	M6	M6	M8	M10	M8	M10	M10
max. screw position i	(mm)	6	6	8	8	8	8	12	12	15	15	15	15	15

ECR (stainless steel)		50	100	160	240
torque range (adjustable)					
TA max	(Nm)	50	100	160	240
TA min	(Nm)	15	40	60	100
max. rotational speed	(min^{-1})	3000	3000	2500	2500
thread of flange ring h	6x	M6	M6	M8	M8
max. screw position i	(mm)	8	8	12	12



The *screws h* for the drive element must be tightened with the usual torque !
Please take notice of the *max. screw position i* (into the flange ring).

ECH (chain wheel integrated)		5	16	25	40	63	80	140	200	400	630	900
torque range (adjustable)												
TA max	(Nm)	5	16	25	40	63	80	140	200	400	630	900
TA min	(Nm)	2	6	10	16	25	32	56	80	160	280	400
max. rotational speed	(min^{-1})	3000	3000	3000	2800	2800	2500	2500	2000	2000	1500	1500



installation instructions

general remarks

1. The fit between the hub and shaft should be chosen as close sliding fit (e. g. H7/j6 or G7/k6).
   Keyway according to DIN 6885 sheet 1.

2. For axial fixation (against displacement on the shaft) threaded pins are provided that clamp the hubs against the keyways.
   An exception is the version „K“ in the types ECE/ECG and ECI, which are for example fixed by a stop collar and washer.

3. The maximum rotational speeds specified in the *Technical data* refer only to the respective clutch by itself.
   If drive elements are incorporated that permit lower rotational speeds, these are obviously decisive,
   (e. g. the maximum permissible chain speed).

4. Emergency switching
   In order to protect the machine and clutch, the drive must be shut off in the event of overloading !
   Normally the disk spring of the clutch activates, via the switching distance, a proximity switch arranged in axial direction and which disconnects the motor power circuit.

for types ECE, ECG, ECI and ECR:

5. The drive element (e. g. pulley) is simply bolted onto the clutch, the torque being transmitted by friction.

6. ECE and pulley are both centred on the shaft and must not be additionally centred relative to one another by a fit bearing.

7. With type ECE the drive element (e. g. pulley) must have its own sliding bearing on the shaft, which supports the tractive force of the belt. The clutch cannot absorb this force.

8. Points 6 and 7 apply as appropriate to types ECG, ECI and ECR. In this case the drive element is centred and mounted directly on the clutch bearing instead of on the shaft. In order to have a lower sliding speed in the event of overloading, the sliding bearing is incorporated in the drive element (is therefore not included in the delivery specification of the ECG, ECI or ECR).

9. The slide bearing clearance has to be < 0,03 mm.
   For the types ECG, ECI and ECR we recommend the installation of the slide bearing SKF type GLYCODUR F.
   The *tolerance f 7 of the bearing* is matched to these slide bearings.

10. With type ECE an adapter flange enables also small pulleys or chain wheels to be installed.

adjustment of disengagement torque TA

The disengagement torque T_A is continuously adjustable (without change the disk spring) !
Special torque ranges on request.
The couplings are pre-set by the manufacturer on assembly at about 70% of the maximum torque.

The torque can be subsequently adjusted by turning the adjustment nut with a sickle spanner. Loosen the Allen set screws beforehand !

IMPORTANT ! The characteristic curve of the disk spring is diminishing within the setting range !

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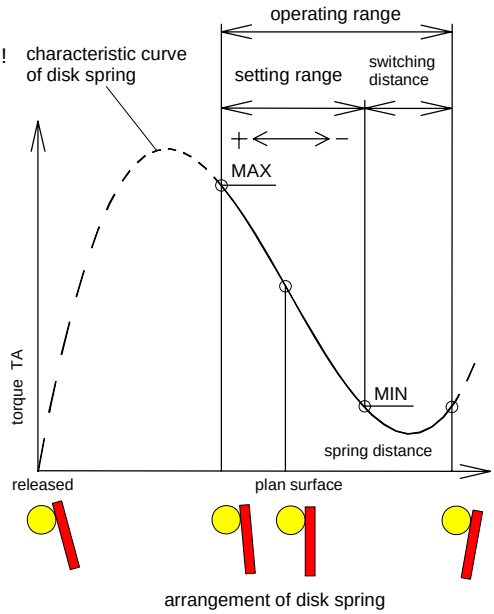
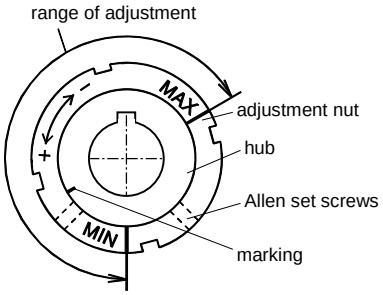
(see illustration to the right and foot)





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